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| 10/815,805 | 04/02/2004 | Chun Pyo Hong | 1751-357 | 9344 |
| 6449 7590 02/28/2007 ROTHWELL, FIGG, ERNST & MANBECK, P.C. 1425 K STREET, N.W. SUITE 800 WASHINGTON, DC 20005 | | | EXAMINER LIN, ING HOUR | |
| | | | ART UNIT 1725 | PAPER NUMBER |

| SHORTENED STATUTORY PERIOD OF RESPONSE | NOTIFICATION DATE | DELIVERY MODE |
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| 3 MONTHS | 02/28/2007 | ELECTRONIC |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 02/28/2007.

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PTO-PAT-Email@rfem.com

| | | | |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/815,805 | Applicant(s) HONG, CHUN PYO | |
| | Examiner Ing-Hour Lin | Art Unit 1725 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-2, 7-8, 10-11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming et al.

Lombard et al (col. 8, lines 16+, Fig. 19) teach the claimed rheoforming apparatus, including a first sleeve (shot sleeve 300) for releasing semi-solid slurry B; a pivotable and flared second sleeve (forming vessel 202), a first plunger 212, 230; thermal jacket 204 with temperature control unit installed around the second sleeve (forming vessel 202); a stirring unit (electromagnetic stator 206), wherein the thermal jacket 204 and the stirring unit (electromagnetic stator 206) move together with the second sleeve (forming vessel 202) for the

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purpose of stirring the molten metal in the second sleeve and controlling the temperature and non-dendritic and solid fraction of semi-solid metallic slurry in the second sleeve and coupling the first sleeve and transporting the slurry for rheoforming.

Lombard et al fail to teach the use of a sealing member or stopper. However, WO '709 (page 5, lines 7+) teaches the use of a sealing member or stopper (cutoff valve 9) or disc 25 in thixotropic casting for the purpose of effectively opening or closing the end of the second sleeve (forming vessel 2). It would have been obvious to one having ordinary skill in the art to provide Lombard et al the use of a sealing member or stopper (cutoff valve 9) or disc 25 in thixotropic casting as taught by Kelly et al in order to control the flow of the slurry through the end of the second sleeve and effectively transport the slurry into the first sleeve for rheoforming.

Lombard et al in view of WO 9712709 fails to teach the use of a time control unit for starting and stopping the stirring unit in terms of the pouring of molten metal and crystalline nuclei formation.

However, Aoyama et al (col. 4, lines 32+) teach the use of applying EM field (motion exerted on the melted metal) concurrently loading the molten metal to the slurry sleeve (slurry container 1) when a portion of the melted metal reaches a temperature below the liquidus temperature and cooling the melted metal at a cooling rate of 3 °C/sec or less, preferably 0.4 °C/sec or less for generating homogeneous crystal nuclei and preventing occurrence of dendrite for the purpose of controlling the fine-grained equiaxed semi-solid slurry and reducing slurry cycling time. Further, Fleming et al (col. 4, lines 46+) teach the use of stopping EM field (agitation) to the vessel after some solid fraction of 0.01-0.2 by weight has formed in the molten metal through rapid cooling with a cooling rate in claimed range 0.2-5.0 °C/sec (see Fig. 1b) for

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the purpose of effectively controlling the fine-grained equiaxed semi-solid slurry (casting) of solid fraction 10-50% (col. 5, lines 6+) by weight and primary particle size between 1-1000 microns (col. 6, lines 11+) by controlled cooling. It would have been obvious to one having ordinary skill in the art to provide Lombard et al in view of WO 9712709 the use of applying EM field concurrently loading the molten metal to the slurry sleeve (slurry container 1) and the use of stopping EM field (agitation) to the vessel after some solid fraction of 0.01-0.2 by weight has formed through controlled cooling as taught by Aoyama et al and Fleming et al in order to effectively controlling the fine-grained equiaxed semi-solid slurry (casting).

Regarding to claim 7, Lombard et al in view of WO '709 and further in view of Aoyama et al and Fleming et al fails to teach the use a temperature control unit installed around the first sleeve. However, the use of temperature control unit installed around the first sleeve such as the one coupled with the thermal jacket 204 installed around the first sleeve have been obvious to one having ordinary skill in the art for the purpose of further adjusting and controlling slurry temperature.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming et al and Carden et al.

Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming et al fails to teach the use a forming unit. However, Carden et al (col. 4, lines 45+ and Fig. 7) teach the use of a forming unit including billet die 56 and saw 60 for the purpose of forming a predetermined billet 1. It would have been obvious to one having ordinary skill in the art to provide Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming

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et al the use of a forming unit as taught by Carden et al in order to effectively form a predetermined billet.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lombard et al in view of WO 9712709 and further in view of Aoyama et al, Fleming et al, Carden et al and Klotzbicher et al.

Lombard et al in view of WO 9712709 and further in view of Aoyama et al, Fleming et al and Carden et al fails to teach the use a forming unit comprising a transfer roller and a cooler. However, Klotzbicher et al (col. 3, lines 11+) teach the use of a forming unit comprising a transfer roller (roller track 13) and a cooler (cooling or quenching facility 14) for the purpose of transferring and cooling the formed billets. It would have been obvious to one having ordinary skill in the art to provide Lombard et al in view of WO 9712709 and further in view of Aoyama et al, Fleming et al and Carden et al the use of a forming unit comprising a transfer roller and a cooler as taught by Klotzbicher et al in order to effectively form, transfer and cool the formed billet.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lombard et al in view of WO 9712709 and further in view of Aoyama et al, Fleming et al, Carden et al and Collot et al.

Lombard et al in view of Kelly et al and further in view of Aoyama et al, Fleming et al, Carden et al fails to teach the use a forming unit comprising a press die. However, Collot et al (col. 3, lines 11+) teach the use of a press die 16 for the purpose of press forming a predetermined product. It would have been obvious to one having ordinary skill in the art to provide Lombard et al in view of WO 9712709 and further in view of Aoyama et al, Fleming et

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al and Carden et al the use of a forming unit comprising a press die as taught by Collot et al in order to effectively press and form a predetermined product.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lombard et al in view of WO 9712709 and further in view of Aoyama et al, Fleming et al and Clark.

Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming et al fails to teach the use of a forming die. However, Clark (col. 5, lines 19+) teaches either the use of a forming die having a die cavity 123 formed by die parts 121 and 126 for the purpose of effectively casting a predetermined product. It would have been obvious to one having ordinary skill in the art to provide Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming et al the use of a forming die as taught by Clark in order to effectively cast a predetermined product.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lombard et al in view of WO 9712709 and further in view of Aoyama et al, Fleming et al and Wang.

Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming et al fails to teach the use of a non-magnetic material for the second sleeve. However, Wang (col. 5, lines 4+) teaches the use of a non-magnetic material for the second sleeve for the purpose of effectively ensuring the efficiency of electromagnetic field in the stirring slurry process. It would have been obvious to one having ordinary skill in the art to provide Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming et al the use of a non-magnetic material for the second sleeve as taught by Wang in order to effectively stir slurry in the sleeve.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lombard et al in view of WO 9712709 and further in view of Aoyama et al, Fleming et al and Peleschka et al.

Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming et al fails to teach the use of branching the second sleeve from the first sleeve inserted with a second plunger. However, Peleschka et al (page 3, paragraph 35+) teach the use of branching the second sleeve (transport chamber 8) from the first sleeve (casting chamber 7) inserted with a second plunger (casting plunger 11) in the first sleeve for the purpose of effectively die casting the slurry into a predetermined product. It would have been obvious to one having ordinary skill in the art to provide Lombard et al in view of WO 9712709 and further in view of Aoyama et al and Fleming et al the use of branching the second sleeve from the first sleeve inserted with a second plunger as taught by Peleschka et al in order to die cast the slurry into a predetermined product.

Response to Arguments

12. Applicant's arguments filed on 11/27/06 have been fully considered but they are not persuasive. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, applicant argued that Lombard et al in view of WO 9712709 fails to teach the use of applying EM field and timing to the sleeve concurrently loading the molten metal to the sleeve.

However, Aoyama et al (col. 4, lines 32+) teach the use of applying EM field (motion exerted on the melted metal applied by frequency and induction) concurrently loading the molten metal to the sleeve (slurry container 1) and controlling the loading timing of molten metal and EM field (motion exerted on the melted metal selected by frequency and induction) such that a portion of the melted metal reaches a temperature below the liquidus temperature and cooling the melted metal at a cooling rate of 3 °C/sec or less, preferably 0.4 °C/sec or less for generating homogeneous crystal nuclei and preventing occurrence of dendrite for the purpose of controlling the fine-grained equiaxed semi-solid slurry and reducing slurry cycling time. It would have been obvious to one having ordinary skill in the art to provide Lombard et al in view of WO 9712709 the use of applying EM field or applying frequency and induction during loading the molten metal to the sleeve (slurry container 1) as taught by Aoyama et al in order to control the fine-grained equiaxed slurry (non-dendritic casting) in the sleeve.

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ing-Hour Lin whose telephone number is (571) 272-1180. The examiner can normally be reached on M-F (9:00-5:30).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

I.H.L.

I.-H. Lin

2/20/07


PATRICK JOSEPH
SUPERVISORY PATENT EXAMINER